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USSR WORK ON THE TRANSFUSION OF ERYTHROCYTE SUSPENSION

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The first transfusion of erythrocytes was carried out in an experiment performed by Prof V. A. Yurevich and Dr N. K. Rosenberg (1914). Kramarenko (1927), Timofeyev (1930), and Krivonos (1941) have worked on the transfusion of erythrocytes. In the USSR literature, the first data on the application of a concentrated erythrocyte suspension for the treatment of surgical conditions were published by B. A. Petrov (1944), who noted a persistent increase of the hemoglobin content and improvement of the general condition. In 1944, transfusion of erythrocyte suspensions was used in Professor Kryukov's therapeutic clinic. In 1945, Prof Kh. Kh. Vlados described at the Moscow Therapeutic Society a series of 207 transfusions of concentrated erythrocyte suspension administered to 58 patients suffering from anemia and leukosis. In 1946, Professor Shafershteyn applied erythrocytotherapy at the pediatric clinic, while Professor Raykhan used it in the clinical treatment of pulmonary tuberculosis. Good results were obtained in the last instances mentioned. In 1946, Ye. G. Tsurinova reported on 166 transfusions which had been administered to 121 patients by the drip method.

At the Faculty Surgical Clinic of the Minsk Medical Institute, transfusion of erythrocytes has been applied since 1944. In the present instance, observations carried out on 116 patients have been collated. These patients received 132 transfusions. The observations were made principally on patients who suffered from induced anemization due to various causes. Transfusion of erythrocytes was applied mainly in the preoperational period as a method of preparing the patients for surgery, as well as in the postoperational period in order to alleviate serious conditions brought about by the operation. The conditions from which the patients suffered were as follows: anemia induced by gastrointestinal ulcers (37 patients); malignant neoplasms (24 patients); suppurative inflammation of serous tissues and of joints (18 patients); suppurative inflammation of the bones (9 patients); sepsis (4 patients); hemorrhages due to various causes (4 patients); and surgical diseases such as tuberculosis of the kidneys, prolonged inflammation processes in soft tissues, calculous pyelitis, and other chronic diseases (20 patients).

Erythrocytic mass [in the form of erythrocyte suspension] was administered in doses of 200-1,000 ml. This necessitated the use of erythrocytic mass obtained from several donors who either belonged to the same blood group or belonged to a different group, but yielded compatible blood. The individual portions of erythrocytic mass were not mixed, but administered separately one after the other taking care not to violate the rule that none of the fractions should be agglutinated by the fraction preceding it.

The concentrated suspension of erythrocytes was obtained by letting the erythrocytes settle in the ampules containing blood, as has been described in Khirurgiya, No 11, 1949. Within 1-2 days, adequate separation of erythrocytes from the plasma is achieved.

The best replacing effect is obtained by using the erythrocyte suspension no later than 2-3 days following its preparation. After this time, the biological activity of the erythrocytes drops day by day. Erythrocytic suspensions which have been stored for prolonged periods are not very effective.

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Administration of erythrocyte suspension results in fewer posttransfusion reactions than administration of plasma or whole blood. After 132 transfusions of concentrated erythrocyte suspension to 116 patients, posttransfusion reactions were observed in six instances, i.e., 4.5% of the cases. In five cases, the reaction was weak, and in one case, strong.

After whole blood has been administered, there is a so-called negative phase of the action of this blood. The negative phase continues for 3-5 days following the transfusion and is accompanied by a reduction of the hemoglobin level and of the number of erythrocytes in the recipient's blood. After administration of erythrocytes in the form of a concentrated suspension, there is an immediate and sustained increase of the hemoglobin level and of the number of erythrocytes. In other words, there is no negative phase.

The general restorative and therapeutic effect resulting from the transfusion of erythrocyte suspension is accompanied by a hemostatic effect. The erythrocyte suspension increases the viscosity of the recipient's blood and also its coagulability, because prothrombin and thrombocytes have been introduced. Furthermore, the vasoconstrictive substances of the plasma contained in the suspension also exert an effect.

Transfusion of erythrocyte suspension is as effective as that of whole blood in the treatment of various types of hemophilia.

In view of the fact that treatment with erythrocytes does not produce any pronounced shifts in hemodynamics, i.e., does not increase the blood pressure, it can be widely applied in cases of cardiovascular insufficiency of various etiology and also in cases of brain diseases accompanied by anemia.

In chronic debilitating diseases of diverse etiology, in cases when a septic infection is present, and in intoxications of various origin, there is often a functional insufficiency of the heart, liver, and kidneys. While in such cases transfusion of blood may be dangerous, erythrocytotherapy can be applied more freely. Hepatic insufficiency (e.g., chronic hepatitis, cirrhosis of the liver) does not contraindicate administration of medium doses (450 ml) of concentrated erythrocyte suspension.

Transfusion of concentrated erythrocyte suspension is indicated in poisonings that are accompanied by oxyhemoglobin deficiency. These are: (1) poisonings by substances (carbon monoxide, illuminating gas) which cause carboxyhemoglobinemia; (2) poisonings by substances that cause methemoglobinemia, i.e., potassium chlorate, aniline, nitroaniline, nitrobenzene, dinitrobenzene, nitrogen oxides, phenol, pyrogallol, and some chemical-warfare agents; and (3) poisonings by substances which combine with erythrocytes and produce hemolysis, i.e., arsine, arsenic, toadstool poisons, snake poisons, etc. In order to treat the poisonings listed above, it is of advantage to combine the transfusions with preliminary bloodletting.

In surgery and gynecology, erythrocytotherapy is a valuable method of preparing anemic patients for surgery and of treating patients after surgical operations.

In the 116 cases under consideration, erythrocytotherapy produced good results in 75.9% of the cases, satisfactory results in 6.9% of the cases, and no results in 17.2% of the cases.

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